

What Is Claimed Is:

1. An image forming apparatus comprising:  
plural image forming units that form respective  
5 color visible images by electrostatically applying  
different color developers onto respective color  
image holders;  
a belt transfer member, in contact with the  
respective color image holders, to sequentially  
10 overlay-transfer the developers applied on the image  
holders of the image forming units;  
intermediate transfer electrode members,  
positioned on an opposite side to the image holders  
of the image forming units, via and in contact with  
15 the belt transfer member, that receive application  
of a primary transfer voltage so as to  
electrostatically transfer the images from the image  
forming units onto the belt transfer member; and  
a paper transfer electrode member, positioned  
20 on an opposite side to a backup member, via and in  
contact with the belt transfer member, that receives  
application of a secondary transfer voltage so as to  
transfer the visible images transferred on the belt  
transfer member onto a print sheet at a time,  
25 wherein the primary transfer voltage is applied  
to the plural intermediate transfer electrode  
members from one power source.

2. The image forming apparatus according to  
claim 1, wherein in the belt transfer member, a  
relative dielectric constant, a surface resistance  
5 and a volume resistance are controlled so as to  
attenuate a potential charged upon initial transfer  
to 1/3 or lower than the primary transfer voltage  
before a belt position of the initial transfer  
arrives at a next transfer position.

10

3. The image forming apparatus according to  
claim 2, wherein in the belt transfer member, the  
relative dielectric constant is 8 or greater, the  
surface resistance is  $1 \times 10^9$  to  $1 \times 10^{11}$   $\Omega/\square$  by  
15 measurement at 1000 V, the volume resistance is  $10^{10}$   
 $\Omega \cdot \text{cm}$  or higher by measurement at 100 V and  $1 \times 10^8$  to  
 $1 \times 10^{10}$   $\Omega \cdot \text{cm}$  by measurement at 500 V.

4. The image forming apparatus according to  
20 claim 3, wherein the intermediate transfer electrode  
member is a transfer roller having a sponge layer on  
its periphery, and has a resistance of  $1 \times 10^5$  to  $1 \times$   
 $10^7$   $\Omega$ .

25 5. An intermediate transfer belt used for primary  
transfer to electrostatically and sequentially  
overlay-transfer images of different color

developers, formed on plural image holders arrayed in a belt movement direction, onto a belt transfer member, and for secondary transfer to transfer the overlaid images onto a print medium at a time,  
5 wherein a relative dielectric constant, a surface resistance and a volume resistance are controlled so as to attenuate a potential charged upon initial primary transfer to 1/3 or lower than the primary transfer voltage before a belt position of the  
10 initial primary transfer arrives at a next primary transfer position.

6. The intermediate transfer belt according to claim 5, wherein the relative dielectric constant is  
15 8 or greater, the surface resistance is  $1 \times 10^9$  to  $1 \times 10^{11}$   $\Omega/\square$  by measurement at 1000 V, the volume resistance is  $10^{10}$   $\Omega \cdot \text{cm}$  or higher by measurement at 100 V and  $1 \times 10^8$  to  $1 \times 10^{10}$   $\Omega \cdot \text{cm}$  by measurement at 500 V.

20

7. A volume resistance measurement method for intermediate transfer belt used in an image forming apparatus, comprising:

25 a measurement step of applying an arbitrary transfer voltage to be measured between electrodes in contact with front and rear surfaces of the intermediate transfer belt and measuring an

attenuation characteristic of a belt potential to elapsed time from stoppage of application of the transfer voltage; and

5 a calculation step of calculating a volume resistance  $\rho$  depending on a change of the belt potential, based on a result of measurement of the attenuation characteristic of the belt potential.

8. The volume resistance measurement method

10 for intermediate transfer belt according to claim 7, wherein at the measurement step, the belt potential is measured by predetermined time  $\Delta t$  from the stoppage of application of the transfer voltage,

15 and wherein at the calculation step, assuming that the belt potential at time  $t_n$  is  $V(t_n)$ ; the belt potential at time  $t_{n-1}$  previous of the time  $t_n$  by the predetermined time  $\Delta t$ ,  $V(t_{n-1})$ ;  $\epsilon^*$ , a relative dielectric constant; and  $\epsilon_0$ , a vacuum dielectric constant of  $8.854 \times 10^{-12}$  [F/m], the volume

20 resistance  $\rho$  depending on the belt potential  $V(t_n)$  is calculated by:

$$\rho[V(t_{n-1}) - V(t_n)]/2 = \Delta t / \{\epsilon^* \epsilon_0 (\ln V(t_{n-1}) - \ln V(t_n))\}$$

9. An image forming apparatus comprising:

25 plural image forming units that form respective color visible images by electrostatically applying different color developers onto respective color

image holders;

a belt transfer member, in contact with the respective color image holders, to sequentially overlay-transfer the developers applied on the image  
5 holders of the image forming units;

intermediate transfer electrode members, positioned on an opposite side to the image holders of the image forming units, via and in contact with the belt transfer member, that receive application  
10 of a primary transfer voltage so as to electrostatically transfer the images from the image forming units onto the belt transfer member; and

15 a paper transfer electrode member, positioned on an opposite side to a backup member, via and in contact with the belt transfer member, that receives application of a secondary transfer voltage so as to transfer the visible images transferred on the belt transfer member onto a print sheet at a time,

wherein the primary transfer voltage applied to  
20 the plural intermediate transfer electrode members and the secondary transfer voltage applied to the paper transfer electrode member are supplied from one power source.

25 10. The image forming apparatus according to claim 9, wherein the secondary transfer voltage is directly supplied from the power source to the paper

transfer electrode member,

and wherein the primary transfer voltage, from the power source and lowered via a voltage drop member, is supplied to the plural intermediate 5 transfer electrode members.

11. An image forming apparatus comprising:

plural image forming units that form respective color visible images by electrostatically applying 10 different color developers onto respective color image holders;

a belt transfer member, in contact with the respective color image holders, to sequentially overlay-transfer the developers applied on the image 15 holders of the image forming units;

intermediate transfer electrode members, positioned on an opposite side to the image holders of the image forming units, via and in contact with the belt transfer member, that apply a primary 20 transfer voltage to transfer portions so as to electrostatically transfer the images from the image forming units onto the belt transfer member;

a paper transfer electrode member, positioned on an opposite side to a backup member, via and in 25 contact with the belt transfer member, that receives application of a secondary transfer voltage so as to transfer the visible images transferred on the belt

transfer member onto a print sheet at a time; and  
a primary transfer power source to apply the  
same primary transfer voltage commonly to the plural  
intermediate transfer electrode members,

5       wherein resistance values of the plural  
intermediate transfer electrode members are set to a  
higher value for a transfer portion in which a  
number of overlaid colors is smaller and to a lower  
value for a transfer portion in which a number of  
10      overlaid colors is larger.

12. An image forming apparatus comprising:  
plural image forming units that form respective  
color visible images by electrostatically applying  
15      different color developers onto respective color  
image holders;

a belt transfer member, in contact with the  
respective color image holders, to sequentially  
overlay-transfer the developers applied on the image  
20      holders of the image forming units;

intermediate transfer electrode members,  
positioned on an opposite side to the image holders  
of the image forming units, via and in contact with  
the belt transfer member, that apply a primary  
25      transfer voltage to transfer portions so as to  
electrostatically transfer the images from the image  
forming units onto the belt transfer member;

a paper transfer electrode member, positioned on an opposite side to a backup member, via and in contact with the belt transfer member, that receives application of a secondary transfer voltage so as to 5 transfer the visible images transferred on the belt transfer member onto a print sheet at a time; and

a primary transfer power source to apply the same primary transfer voltage commonly to the plural intermediate transfer electrode members,

10 wherein compensation resistors are provided between the primary transfer power source and the plural intermediate transfer electrode members, and resistance values of the compensation resistors are set to a higher value for a transfer portion in 15 which a number of overlaid colors is smaller and to a lower value for a transfer portion in which a number of overlaid colors is larger.

13. An image forming apparatus comprising:

20 plural image forming units that form respective color visible images by electrostatically applying different color developers onto respective color image holders;

a belt transfer member, in contact with the 25 respective color image holders, to sequentially overlay-transfer the developers applied on the image holders of the image forming units;

intermediate transfer electrode members, positioned on an opposite side to the image holders of the image forming units, via and in contact with the belt transfer member, that apply a primary transfer voltage to transfer portions so as to electrostatically transfer the images from the image forming units onto the belt transfer member;

a paper transfer electrode member, positioned on an opposite side to a backup member, via and in contact with the belt transfer member, that receives application of a secondary transfer voltage so as to transfer the visible images overlay-transferred on the belt transfer member onto a print sheet at a time; and

a primary transfer power source to apply the same primary transfer voltage commonly to the plural intermediate transfer electrode members,

wherein the plural intermediate transfer electrode members are conductive members provided in positions away from contact positions between the respective color image holders and the belt transfer member in a belt surface direction,

and wherein distances from the contact positions are set to a shorter value in a transfer portion in which a number of overlaid colors is larger and to a longer value for a transfer portion in which a number of overlaid colors is smaller.